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A Taxonomic Study of *Miscanthus* Section Kariyasua (Gramineae)

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Miscanthus section Kariyasua is revised based on herbarium studies, SEM examination, and field observations. Seven distinct taxa are recognized including one new combination, *M. longiberbis* Nakai var. *changii* (Y.N.Lee) Ibaragi & H.Ohashi. *Miscanthus longiberbis* Nakai var. *longiberbis* and var. *changii* (Y.N.Lee) Ibaragi & H.Ohashi are endemic to Korea and the remaining five, i. e., *M. intermedius* (Honda) Honda, *M. tinctorius* (Steud.) Hack., *M. oligostachyus* Stapf var. *oligostachyus* f. *oligostachyus* and f. *ciliatus* Hiyama, and *M. oligostachyus* Stapf var. *shinanoensis* Y.N.Lee, are endemic to Japan. A key to the taxa, distribution maps, and morphological descriptions for each taxon are presented.

Key words: Distribution, *Miscanthus*, Sect. Kariyasua, taxonomy.

Section Kariyasua of the genus *Miscanthus* is characterized by large spikelets and rather short, hairy, narrowly ovate leaves (Hirayoshi et al. 1956). The genus has a wide distribution range in Oceania and Asia, but the section is restricted to Korea and Japan.

Lee (1964a, 1964b, 1964c) revised Kariyasua and recognized the following five distinct taxa: *Miscanthus changii* Y.N.Lee, *M. oligostachyus* var. *intermedius* (Honda) Y.N.Lee, *M. tinctorius* (Steud.) Hack., *M. oligostachyus* Stapf var. *oligostachyus* and *M. oligostachyus* var. *shinanoensis* Y.N.Lee (Lee 1964a, 1964b). No other revisions have been done for all the members of this section, although many studies on subtaxa belonging to the section have been done by Chung (1955, 1965), Ohwi (1965, 1982), Lee (1966, 1996), Koyama (1987), Osada (1989) and Kitamura et al. (1998). During our taxonomic works on *Miscanthus*, however, we found that the classification of sect. Kariyasua is confused. The main reason for the confusion is that two Korean species, *Miscanthus changii* and *M. oligostachyus* var. *intermedius*, have not been adequately circumscribed due to wide ranges of variation in their diagnostic characteristics. In this study, we have revised all the members of the section.

Materials and Methods

This study is based mainly on herbarium material borrowed from the KYO, TI, and TUS (abbreviations according to Holmgren et al. 1990). Specimens were also examined at KANA, MAK, PNH, TKPM, TNS, and the herbarium of Tamagawa University, Tokyo. Dots on distribution maps are based exclusively on the specimens studied. Field surveys were carried out in Japan and Korea. Living materials collected in Japan were planted and studied at Tohoku University and the garden of Tokushima Prefectural Museum. We examined the pollen of *Miscanthus oligostachyus* and *M. tinctorius*.

The pollen grains were taken from a herbarium specimen, coated them with gold-palladium in a vacuum, and examined them through a scanning electron microscope (Hitachi S-4100). The axis lengths were measured on 25 grains and the pore diameters were measured on 5 grains in each sample.

Taxonomic characters

Habit and habitat The species of Kariyasua are all tussock grasses with rhizomes. The rhizome is usually short, but *Miscanthus oligostachyus* occasionally has long ones. The preferred habitat of *M. oligostachyus* is mainly open, sunny edges or mountain slopes consisting of volcanic ash, while *M. tinctorius* and *M. intermedius* grow in shaded, wet forest margins (Fig. 1).

Leaf The leaves of members of sect. Kariyasua are wide, short, and linear or very narrowly ovate. The collar is covered by long white hairs except in *Miscanthus longiberbis* (Fig. 2). This character is stable in the species and has been used as an important taxonomic character (Honda 1930, 1936). We also confirmed that the characteristic is useful for taxonomic work in this section. Lee (1964d) examined anatomical and epidermal patterns of leaf blades in the genus *Miscanthus*. He found that each section of the genus has its own pattern, and all the members of sect. Kariyasua have the same pattern.

Inflorescence and spikelet The inflorescence features of the sect. Kariyasua are distinct from other sections of *Miscanthus* (Lee 1964b). The inflorescence is a panicle bearing several suberect racemes on a short axis. The raceme has numerous spikelets each with a short pedicel. The spikelet of sect. Kariyasua has callus hairs on the base. This hair is usually shorter than the length of a spikelet, and the length differs between each species (Fig. 3), so it has been used as an important diagnostic character (Lee 1964b, Koyama 1987). In particular, the hair of *M. longiberbis* is almost as long as the spikelet, by which this species is easily distinguished from others (Nakai 1917, Honda 1930, Koyama 1987). Although *M. intermedius* resembles *M. tinctorius*, the callus hair of the former is long (4–7 mm), whereas that of the latter is short (2–4.5 mm). Therefore, we also used this characteristic for classification.

Glume The glume of this section is coriaceous, pubescent and narrowly ovate. The hairs have not previously been used for taxonomy in this section, but we found that their length differ by species on the lower glume. *Miscanthus longiberbis* and *M. oligostachyus* have longer hairs than others (Fig. 3).

The glume has several veins, and the number of veins on the upper glume has been used as a taxonomic character (Lee 1964b, 1964c). Lee (1964b) reported three veins in *Miscanthus longiberbis*, *M. oligostachyus*, and *M. intermedius*, and five to seven in *M. tinctorius*. Koyama (1987) reported three in *M. tinctorius*, and three to five in *M. oligostachyus*. We found three to five in *M. oligostachyus* and *M. tinctorius*, three to six in *M. intermedius* and three or four in *M. longiberbis* var. *longiberbis*. This characteristic shows wide variation and there is no clear discontinuity between taxa. Therefore we did not use it as a diagnostic character for our work. Bicellular microhairs, silica cells, and prickles occur on the abaxial surface of the lower glume of all taxa but do not differ among taxa.

Awn The awn of sect. Kariyasua is straight, bent, or geniculate, and occurs on the lemma apex of the upper floret. Awn length has been used as an important taxonomic character (Honda 1930, Lee 1964a, 1966, Koyama 1987). Actually, *Miscanthus oligostachyus*

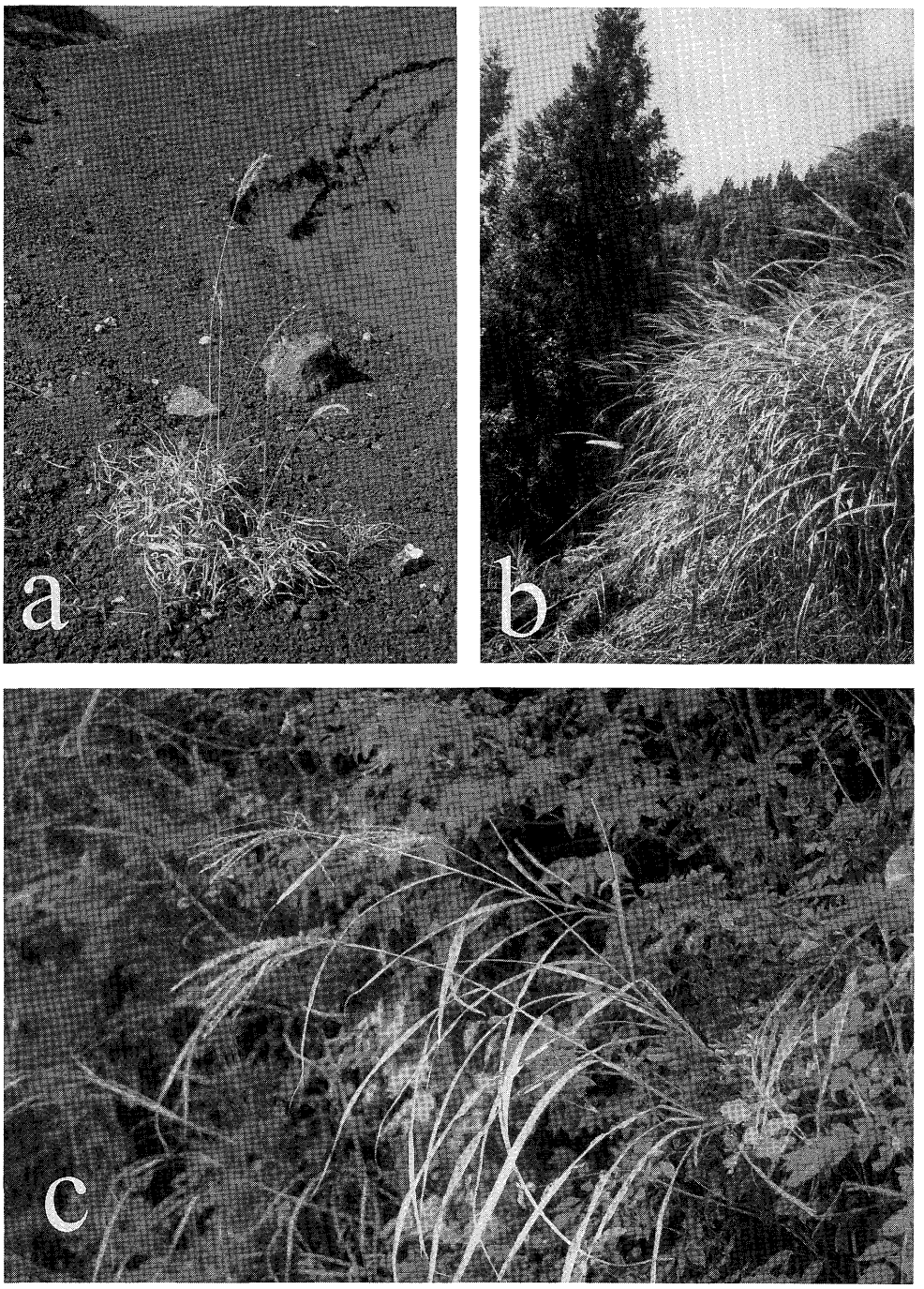

Fig. 1. Habit and habitat of members of *Miscanthus* sect. Kariyasua. a: *M. oligostachyus* var. *oligostachyus* f. *oligostachyus* (Tarohboh, Mt. Fuji, alt. ca. 1200 m, 09 Nov. 1997), b: *M. intermedius* (Mt. Higashi-Chokaisan, Akita Pref., alt. ca. 500 m, 13 Oct. 1998), c: *M. tinctorius* (Mt. Chohroh, Kyoto Pref., alt. ca. 200 m, 11 Nov. 1998).

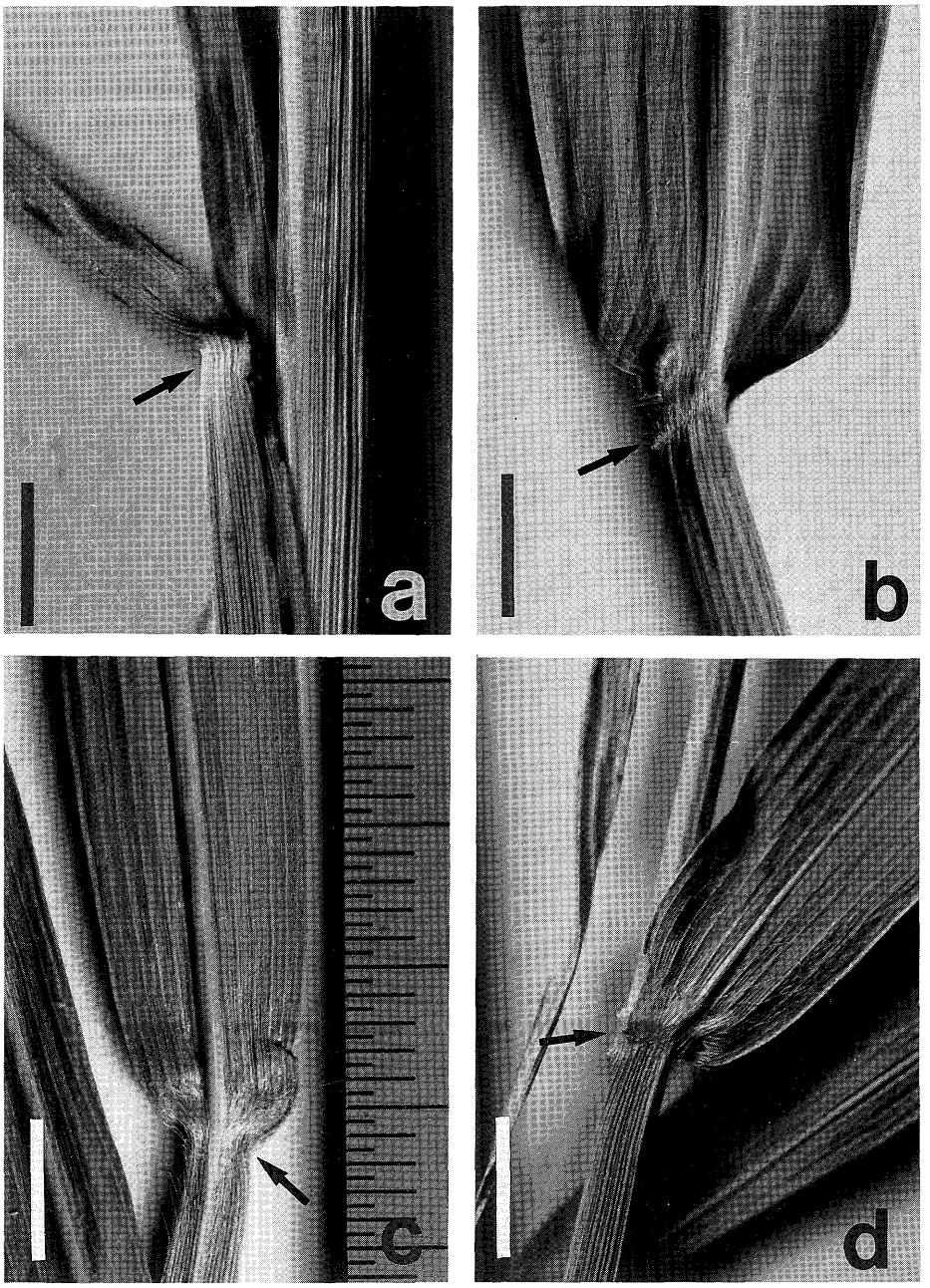

Fig. 2. Hairs on the collar of leaf sheath. a: *Miscanthus longiberbis* var. *longiberbis*, hairless; b: *M. intermedius*, hairy; c: *M. tinctorius*, hairy; d: *M. oligostachyus* var. *oligostachyus* f. *oligostachyus*, hairy. Bar = 5 mm.

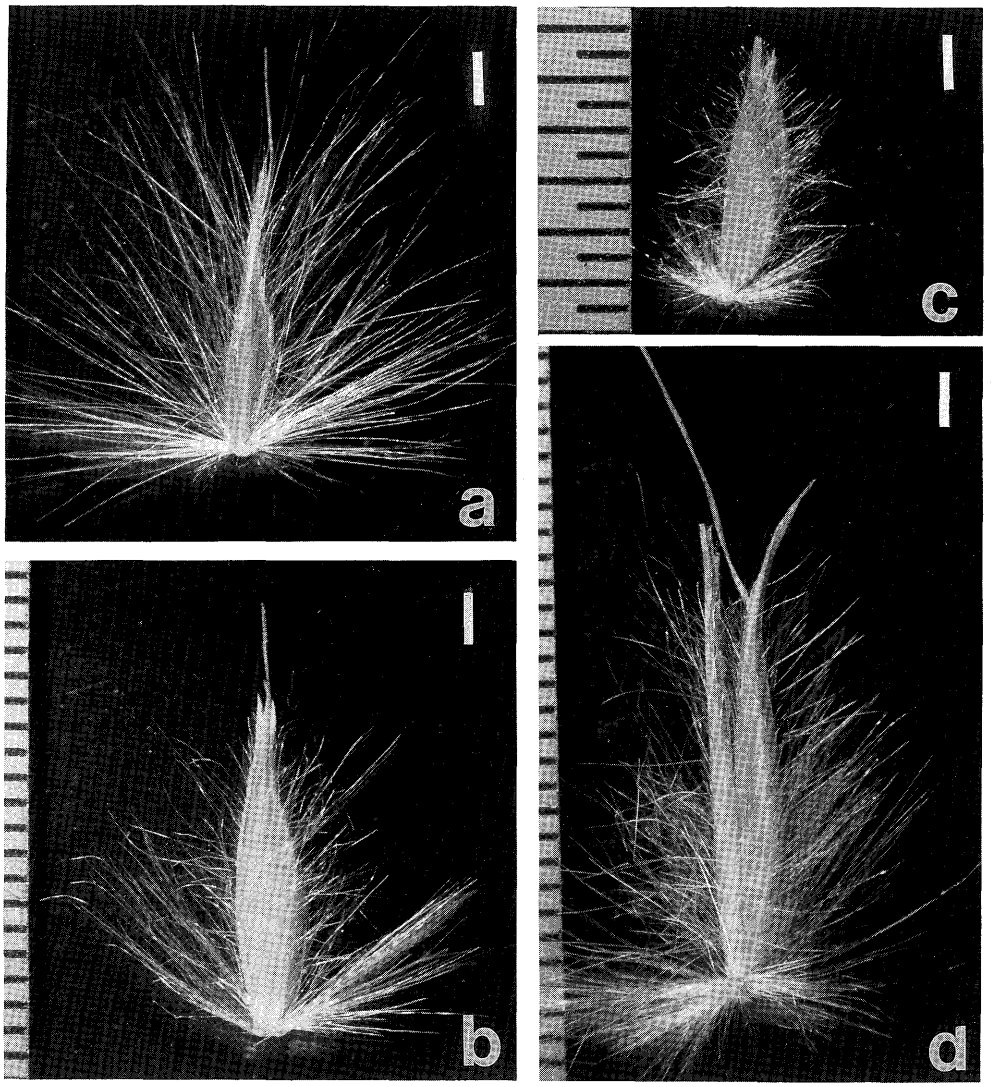

Fig. 3. Spikelets showing callus hair length, awn length, and hair length on glumes. a: *Miscanthus longiberbis* var. *longiberbis*; b: *M. intermedius*; c: *M. tinctorius*; d: *M. oligostachyus*. Bar = 1 mm.

has awns 5–15 mm long and *M. intermedius* 3–7 mm long, while *M. tinctorius* has no awn or a very short projection less than 3 mm long (Fig. 3). *Miscanthus longiberbis* has been characterized by having a long awn more than 5 mm long (Nakai 1917, Lee 1964c, Chung 1965). However, as Ohwi (1942) pointed out, the awn of this species varies from 1 mm to 8 mm long within a specimen. It is hence impossible to distinguish this species from other taxa by this character.

Lodicule The lodicule is generally interpreted as a reduced perianth (Chase 1937, McCusker 2002), and is glabrous and trun-

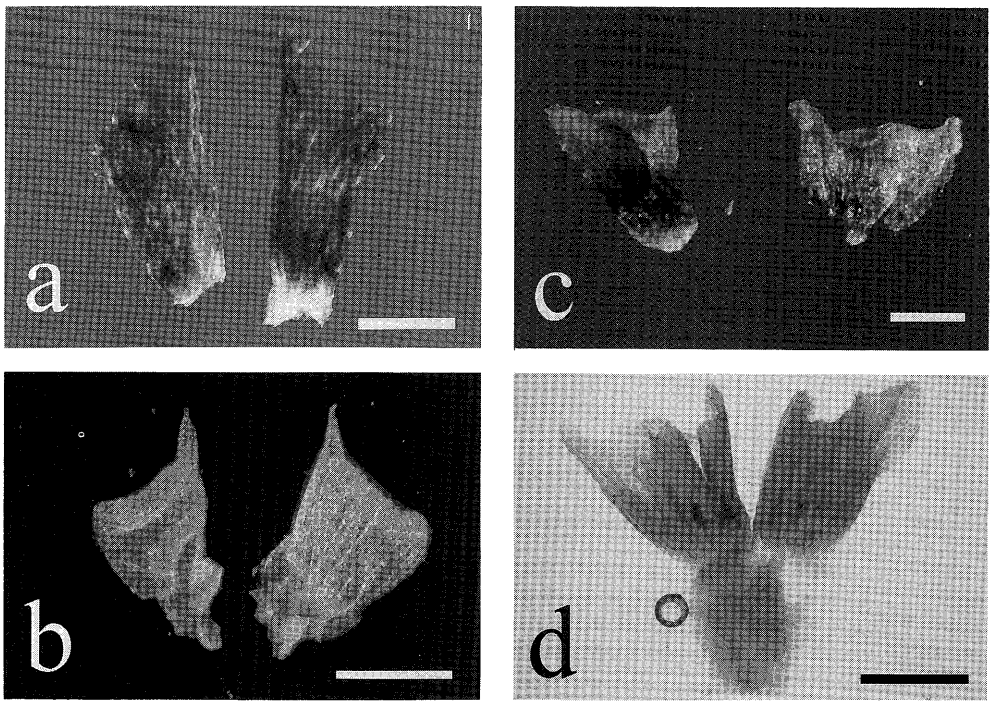

Fig. 4. Pair of lodicules showing inside of the upper floret. a. *Miscanthus longiberbis* var. *longiberbis* (Park, 10 Oct. 1936, KYO); b. *M. tinctorius* (Sadajiro Suzuki, 07 Sep. 1935, TUS); c. *M. oligostachyus* var. *oligostachyus* f. *oligostachyus* (Abe 56724, TKPM); d. *M. intermedius* (Iwabuchi 6372, TUS). Bar = 0.5 mm.

cate in sect. Kariyasua (Stapf 1898, Lee 1964a, 1966). The lodicules of *M. intermedius*, *M. longiberbis*, *M. oligostachyus*, and *M. tinctorius* are truncate, transparent or dark red, and 0.7–1.5 mm long (Fig. 4), and are similar to those of other members of the Panicoideae which were reported by Hsu (1963, 1965). This character shows no variation between the taxa of Kariyasua and cannot be used for classification in this section.

Fruit The fruit of sect. Kariyasua is a caryopsis. Although the features of fruits and the spermoderm patterns of caryopses on numerous grasses have been investigated by Jordan et al. (1983, 1985), and Sendulsky et al. (1986), no reports were made on this section. In *Miscanthus oligostachyus* and *M. intermedius*, the caryopsis is elliptical, dark reddish-brown to bright brown, and 2–2.5 mm long (Fig. 5), and the embryo is half as long as the fruit. The spermoderm pattern on the caryopsis of this section is reticulate.

Chromosome numbers The genus *Miscanthus* has a basic chromosome number of x = 19 (Hirayoshi et al. 1956), but x = 7 is also reported by Church (1929). Adati and Shiotani (1962) stated that the genus has an amphidiploid origin from an intercross of species with n = 10 and n = 9.

The chromosome numbers of the members of sect. Kariyasua have been reported as follows: *Miscanthus tinctorius* has 2n = 38 (Hirayoshi et al. 1955, 1956, Adati and Mitsuishi 1956, Adati 1958), *M. oligo-*

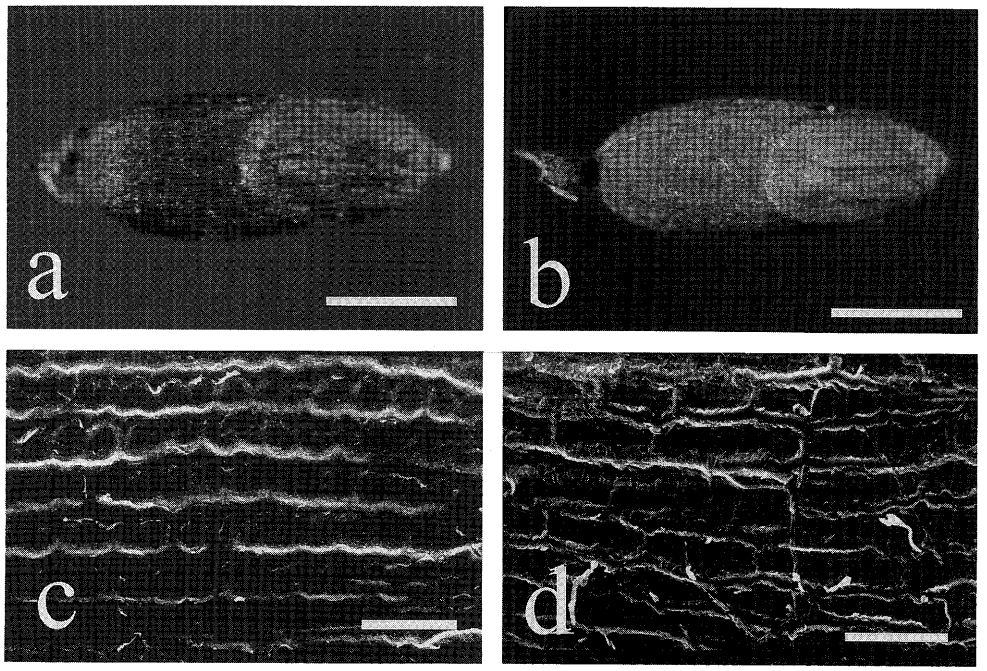

Fig. 5. Caryopses and their surfaces. a, c: *Miscanthus oligostachyus* var. *oligostachyus* f. *oligostachyus* (Yokoyama & al. 97104070, TUS); b, d: *M. intermedius* (Yokoyama & al. 97104013, TUS). Bar = 1 mm for a and b, 50 μm for c and d.

stachyus has 2n = 38 (Hirayoshi et al. 1956, Adati and Mitsuishi 1956, Adati 1958), and *M. intermedius* has 2n = 76 (Hirayoshi et al. 1956) or 2n = 114 (Hirayoshi et al. 1956, Adati 1958).

Pollen The pollen of *Miscanthus oligostachyus* and *M. tinctorius* is globose and monoporate and has granulate sculpturing (Fig. 6). Measurements for the former are (33.5–) 36.5 (–40.9) × (30.3–) 34.2 (–36.7) μm, and for the latter: (32.6–) 41.4 (–44.7) × (30.3–) 37.8 (–43.1) μm. The pore diameter is 1.9 ± 0 μm in the former, (2.2–) 2.6 (–2.9) μm in the latter. Acedo (1999) examined the pollen of Iberian species of the genus *Bromus* and reported that the pollen is the globose and monoporate type generally seen in Gramineae. This is very similar to the pollen of *M. oligostachyus* and *M. tinctorius*.

Taxonomic treatment

Miscanthus section **Kariyasua** Ohwi ex Hirayoshi, Nishikawa & Kubono in Res. Bull. Fac. Agr. Gifu Univ. **7**: 9. 1956; S.Adati in Bull. Fac. Agr. Mie Univ. **17**: 66. 1958; Y.N.Lee in J. Jpn. Bot. **39** (10): 293. 1964. Type: *Miscanthus tinctorius* (Steud.) Hack.

Key to the species

1. Collar glabrous.....2. *M. longiberbis*
1. Collar hairy
 2. Awn, if present, shorter than 3 mm .....4. *M. tinctorius*
 2. Awn more than 3 mm long
  3. Glume hairs less than 3 mm; culm more than 4 mm in diameter at the middle; awn 3–7 mm long.....1. *M. intermedius*

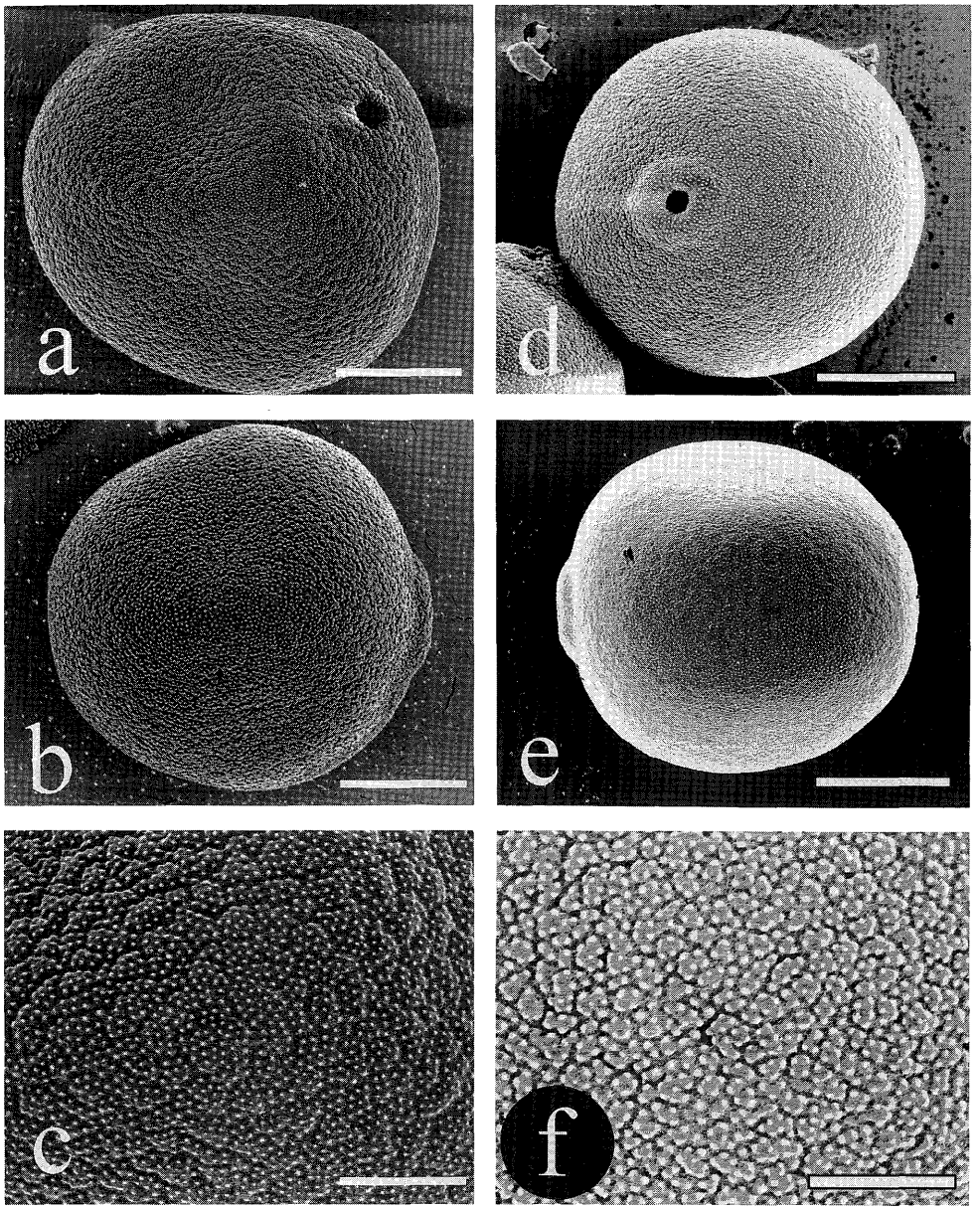

Fig. 6. SEM photographs of pollen grains. a–c. *Miscanthus tinctorius* (a, c: Sadao Suzuki, 20 Sep. 1954, TUS; b: Sadao Suzuki, 10 Sep. 1971, TUS); d–f. *M. oligostachyus* (Sadao Suzuki, 08 Aug. 1949, TUS). Bar = 12 μm for a; 10 μm for b, d, e; 3.75 μm for c, f.

3. Glume hairs more than 3.5 mm; culm less than 3 mm in diameter at the middle; awn 5–15 mm long .....3. *M. oligostachyus*

1. **Miscanthus intermedius** (Honda) Honda in Icon. Pl. Asiat. **1**: 64. pl. 29. 1936; Osada, Illust. Grass. Japan: 680. 1989. – *Miscanthus longiberbis* Nakai var. *inter-*

medius Honda in Bot. Mag. Tokyo **47**: 296. 1933. – *Miscanthus tinctorius* (Steud.) Hack. var. *intermedius* (Honda) Ohwi in Acta Phytotax. Geobot. **11**: 150. 1942 – *Miscanthus oligostachyus* Stapf subsp. *intermedius* (Honda) T.Koyama, Grass. Jap. Neighb. Reg. 517. 1987.

Type: Japan. Honshu. Akita Pref. (prov. Ugo). Yuzawa (Y. Satake 321, Holotype TI).

Perennial with rhizomes. Rhizomes hard, covered by scales. Culms tufted, erect, hard, 100–203 cm tall, 4–6 mm in diameter at the middle. Nodes hairy (hairs 1 mm long), otherwise smooth. Leaves green, sheath rounded on the back, collar hairy (hairs 2–3 mm long). Ligule membranous, 2.5–3 mm long, obtuse, ciliate or dentate at margin. Leaf blade linear, 18–45 cm long, 12–23 mm wide, truncate at the base, adaxial side glabrous or nearly so, abaxial side pilose. Inflorescence compound racemose, 10–20 cm long, 5 cm wide, axis 1–3 cm long, with 2–13 racemes. Racemes spikelike, 7–17 cm long, clustered at or near the apex of the culm, spreading; joint of inflorescence and peduncle hairy.

Pedicels scabrous or glabrous on the edge, paired, unequal, long ones 5–7 mm long, short ones 0.5–2.8 mm long. Spikelets narrowly ovate, somewhat flattened, 5.5–7.5 mm long, 1–1.5 mm wide, callus hairs white, 4–7 mm long, usually shorter than spikelet. Lower glume narrowly ovate, coriaceous, 5–6-nerved, hairy (1.5–3 mm long), yellow or yellowish brown, apex bifid. Upper glume narrowly ovate, coriaceous, long hairy, almost as long as the lower glume, 3–6-nerved. Sterile lemma 5–7 mm long, 1-nerved, apex acute, margin ciliate. Spikelet 2 flowered, but lower floret sterile. Sterile lemma membranous, 1-nerved or nerveless, apex attenuated or acute. Fertile lemma membranous, 4–6.5 mm long, 1-nerved, apex acute, margin ciliate. Palea membranous, narrowly ovate, 2.5–5 mm long, margin ciliate, vein less. Awn straight, bend or genicurate, 3–7 mm long, many prickles on the edge. Anthers 3, 3.5–3.8 mm long, vermilion or dark brown. Stigma feathery, dark purple or dark brown, exerted from the side of spikelet. Lodicule 2, trapezoid, ca. 0.8 mm long, dark red. Caryopses elliptic, 2–2.5 mm long, dark reddish-brown to bright brown.

Specimens examined: **JAPAN. HONSHU. Akita.** Yuzawa-machi (Y. Satake 321, TI Holotype); Yuzawa-machi (Y. Satake 322, 323, 324, Aug. 1929, 23 Aug. 1928, TI); Ogachi-gun, Minase-mura, Motokoyasu. alt. 300–500 m (K. Yoshioka & K. Saito, 23 Aug. 1965, TUS); Higashiminase-mura, Syunuma. alt. ca. 1000 m (The staff of the Bot. Gard., 02 Sep. 1972, KYO). **Yamagata.** Ginzan-onsen (C. Suzuki 3, TI; 13 Aug. 1941, TUS); Hayama (T. Makino, 04 Oct. 1918, MAK); Iidesan (U. Faurie 1730, KYO); Kitamura-yama-gun, Ohishida-machi, Imajuku (J. Yokoyama & al. 97104013, TUS); Komatsu (Y. Kato 11202, KYO); near Mt. Gassan (F. Kunori, 05 Aug. 1934, TI); Murayama-shi, Ohkura-mura (T. Makino, 04 Aug. 1932, MAK). **Gunma.** Mizukami (K. Hisauchi, 05 Aug. 1933, TI); Shimizu-tohge. alt. 1300 m (T. Momiyama, 16 Sep. 1951, TI); Tone-gun, Mt. Komochi (M. Tobe, 18 Sep. 1955, MAK); Mt. Tanigawadake (M. Nakamura, 05 Sep. 1937, MAK). **Niigata.** en route from Kamihiramaru to Nagasawa, Mt. Kazano-yama. alt. 500–700 m (N. Kurosaki 11452, KYO); Yanagisawa, Mitsumata-mura (T. Yamazaki et al., 19 Aug. 1964, KYO); Itoigawa-shi (N. Nakagawa 40, MAK); Oguni-machi, Hachiohji-Nataike (S. Iwano 18343, TUS); Minowa (S. Iwano 19119, TUS); Ohgai (S. Iwano 18833, TUS); Shinrin-kohen (S. Iwano 17097, TUS); Ojiya-shi (R. Kobayashi, 19 Aug. 1907, MAK); Ojiya-shi, Futamata. alt. 200 m (Y. Ikegami 104460, TUS); Shimoda-mura, Mt. Sumondake. 640 m (I. Ito 27310, TUS); Yuzawa (T. Sato 7914, TI); Higashikubiki-gun, Maki-mura, Utsunomata. alt. 350–650 m (N. Kurosaki 11390, KYO); Utsunomata. alt. 350–650 m (N. Kurosaki 11391, KANA); Kariwa-gun, Hachikokusan (S. Iwano 4276, TUS); Kamiogunimura (S. Iwano 542, TUS); Oguni-machi, Enmeiji. alt. 200 m (I. Ito 25443, TUS); Yoneyama, Notaghuchi (S. Iwano 13202, TUS); Kitauonuma-gun, Hirose-mura (S. Iwata 61, 119, MAK); Irihirose-mura, Ohshirakawa. alt. 400 m (T. Yamazaki 6572, KANA); Irihirose-mura, Ohshirakawa. alt. 400 m (T. Yamazaki, 08 Aug. 1962, TI); Koridon-no-ike (S. Iwano 7231, TUS); Kitauonuma-gun, Mt. Sumon-zan (S. Iwano 12124, TUS); Minimiuonuma-gun, Mitsumata-mura, Yagisawa. alt. 600 m (T. Yamazaki & al., 19 Aug. 1964, TI); Shiozawa-machi, Shimizu-tohge. alt. 800 m (I. Ito 23369, TI); Yuzawa-machi, Mitsumata (Y. Ikegami

28244, TUS); Nagaoka-shi, Miyamoto (T. Kurihara, 07 Aug. 1904, MAK); Mottate-tohge (S. Iwano 14935, TUS); Nakakubiki-gun, Yone-yama (S. Iwano 625, TUS); Nakasato-mura, Tashiro. alt. 740 m (I. Ito 23509, TI); Tochio-shi, Kuriyamazawa. alt. 400 m (S. Iwano 27258, TUS). **Toyama.** Nakashinkawa-gun, Kamiichi-cho, Hinotani (N. Kurosaki 2623, KANA). **Nagano.** Kurohime-kogen, Shinano-machi, Kamiminochi-gun (M. Ogawa 07501, TKPM); Middle of Mt. Madarao (M. Mizushima 12624, MAK); Nozawaonsen-mura (Odagiri 38, MAK); Shimominochi-gun, Iiyama-shi (I. Yokouchi, 26 Aug. 1961, MAK).

Distribution: Endemic to Japan. Mainly in Japan Sea side regions in Honshu (Fig. 7a).

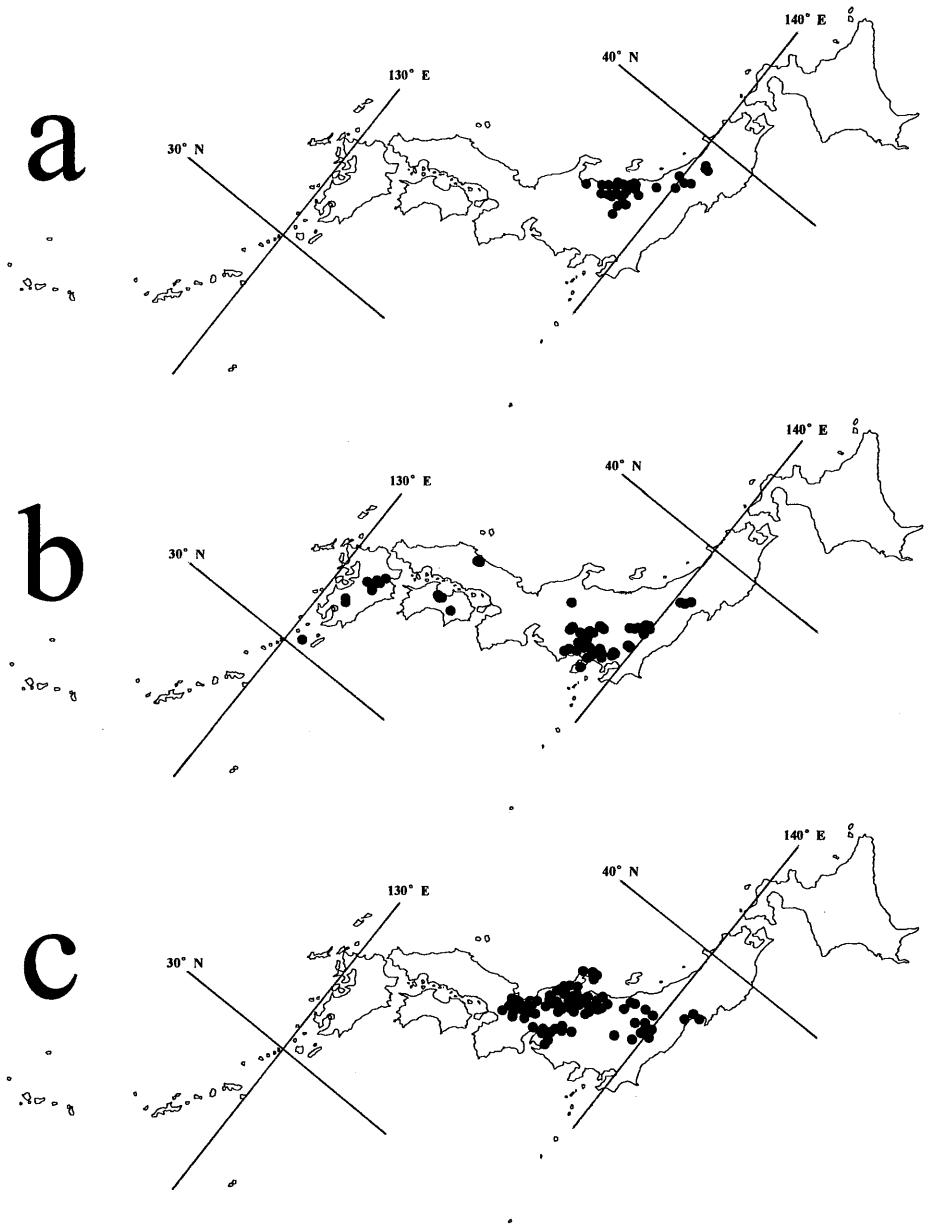

Fig. 7. Distribution maps of sect. Kariyasua. a: *Miscanthus intermedius,* b: *M. oligostachyus* var. *oligostachyus* f. *oligostachyus,* c: *M. tinctorius.*

2. **Miscanthus longiberbis** (Hack.) Nakai in Bot. Mag. Tokyo **30**: 12. 1916; Mori, Enum. Pl. Cor. 47.1922; Honda in J. Fac. Sci. Tokyo Univ. Bot. **3**(1): 389. 1930, pro parte; Ohwi in Acta Phytotax. Geobot. **11**(3): 150. 1942. – *Miscanthus matsumurae* Hack. var. *longiberbis* Hack. in Bull. Herb. Boissier ser. 2. **4**(6): 532. 1904; Nakai in J. Coll. Sci. Imp. Univ. Tokyo. **31**: 338. 1911. – *Miscanthus sinensis* var. *longiberbis* (Hack.) I.C.Chung in J. Wash. Acad. Sci. **45** (7): 215. 1955. – *Miscanthus oligostachyus* Stapf var. *longiberbis* (Hack.) I.C.Chung, Korean Grass. 152. 1965. – *Miscanthus oligostachyus* Stapf subsp. *longiberbis* (Hack.) T.Koyama, Grass. Jap. Neighb. Reg. 517. 1987.

Type: Korea. Tsioo-enli (Uchiyama, 13 Aug. 1902 TI, Isotype, Fig.10).

Perennial with rhizomes. Rhizomes hard, 2.5–3 mm thick, covered by scales. Culms tufted, erect, hard, lustrous, 40–75 cm tall, 3–4 mm in diameter at the middle. Nodes hairy (hairs 1–1.2 mm long), with a bud and sometime an elongate shoot from each node. Leaves green, sheath rounded on the back, collar glabrous. Ligule membranous, 0.5–1 mm long, obtuse, dentate, ciliate at margin. Leaf blade linear, 18–29 cm long, 6–14 mm wide, glabrous on both surfaces. Inflorescence compound racemose, 13–20 cm long, 5 cm wide, axis 2.5–8 cm long, with 5–7 racemes. Racemes spikelike, 10–12 cm long, clustered at or near the apex of the culm, spreading, axis smooth, hairy at each node, joint of inflorescence hairy.

Pedicels scabrous or glabrous on the edge, paired, unequal, long ones 3.8 mm long, short ones 1 mm long. Spikelets narrowly ovate, somewhat flattened, 5–6 mm long, 0.7–1 mm wide, callus hairs white or white with purple spots, 4.5–8 mm long, almost as long as spikelet. Lower glume narrowly ovate, coriaceous, 3–7-nerved, long hairy (3.5–7.5 mm long), yellow or yellowish brown, apex attenuated or bifid. Upper glume narrowly ovate, coriaceous, long hairy, almost as long as the lower glume, 3–4-nerved, long hairy, almost as long as the lower glume, apex attenuated. Sterile lemma 4–4.5 mm long, nerveless, apex acute. Spikelet 2-flowered, but lower floret sterile. Sterile lemma membranous, 1-nerved or nerveless, apex attenuated or acute. Fertile lemma membranous, 3 mm long, 1-nerved, apices attenuated or bifid, margin ciliate. Palea membranous, 2 mm long, vein less, margin ciliate. Awn straight, bent or rarely genicurate, 1–8 mm long, many prickles on the edge. Anthers 3, 2.5 mm long, orange. Stigma feathery, dark purple, exerted from the side of spikelet. Lodicules about 0.7 mm long, dark red.

The rhizome and the distribution pattern of hairs on the lower glume resemble those of *M. sacchariflorus* (Maxim.) Hack. var. *gracilis* Y.N.Lee. Section Kariyasua is reported to have a close relationship to *M. sacchariflorus* (Hodkinson et al. 1997).

Lee (1964c) made a new combination, *Miscanthus oligostachyus* Stapf var. *intermedius* (Honda) Y.N.Lee, and treated *M. matsumurae* Hack. var. *longiberbis* Hack. as its synonym. However, *M. matsumurae* var. *longiberbis* Hack. was described in 1904 and is older than *M. longiberbis* var. *intermedius* Honda described in 1933. Therefore, *M.oligostachyus* Stapf var. *intermedius* (Honda) Y.N.Lee. is an invalid name.

Key to the varieties of *Miscanthus longiberbis*

1. Upper glume 3–4-nerved; leaf blade 6–14 mm wide.....var. *longiberbis*
1. Upper glume 5–7-nerved; leaf blade 5–8 mm wide.....var. *changii*

2-1. **Miscanthus longiberbis** (Hack.) Nakai var. **longiberbis**

Specimens examined. **Korea.** Tsioo-enli (Uchiyama, 13 Aug. 1902, TI, Isotype); Kyonggi-do (Park, 10 Oct. 1936, KYO); Kapyong (Chang Heungdo 1184, KYO).

Distribution: Endemic to Southern Korea.

2-2. **Miscanthus longiberbis** (Hack.) Nakai var. **changii** (Y.N.Lee) Ibaragi & H.Ohashi, comb. et stat. nov. – *Miscanthus changii* Y.N.Lee in J. Jpn. Bot. **39**(4): 115–116. 1964; Y.N.Lee in J. Jpn. Bot. **39**(10): 295. 1964; Chung, Kor. Grass. 153. 1965; Y.N.Lee, Fl. Korea. 1032. 1996.

Type: Korea. Kapyong (Chang Heungdo, 07 Sep. 1940, TNS, Holotype).

Specimen examined. Holotype.

3. **Miscanthus oligostachyus** Stapf in Bull. Misc. Inform. Kew **1898**: 227. 1898; Honda in J. Fac. Sci. Univ. Tokyo, Sect. 3 Bot.: 390. 1930; Y.N.Lee in J. Jpn. Bot. **39** (10): 294. 1964; Osada, Illust. Grasses Japan: 678. 1989. – [*Miscanthus tinctorius* (Steud.) Hack. var. *aristata* Makino ex Honda nom. inval., as syn. of *Miscanthus oligostachyus* Stapf in J. Fac. Sci. Univ. Tokyo, Sect. 3 Bot. : 390.1930].

Type: Japan. Nikko Mts. (Maries s. n., n. v.).

Miscanthus matsumurae Hack. [ex Matsum. in Bot. Mag. Tokyo **11**: 492. 1897, nom. nud.] in Bull. Herb. Boiss. **7**: 640. 1899; Hack. in Bull. Herb. Boiss. **2**: 522. 1904; Nakai in Bot. Mag. Tokyo **31**: 12. 1917.

Type: in monte Fuji, prov. Suruga. (Matsumura s. n., n. v.).

Perennial with rhizomes. Rhizomes hard, 8–20 cm long, 1.5–2 mm thick, covered by scales. Culms tufted, erect, hard, 19–145 cm tall, 1.2–3 mm in diameter at the middle. Nodes hairy (hairs 0.5–1 mm long), otherwise smooth. Leaves whitish green, sheath rounded on the back, collar hairy (hairs 1–1.5 mm long). Ligule membranous, 1–3 mm long, obtuse or truncate. Leaf blades narrowly ovate, 8–34 cm long, 3–17 mm wide, attenuate or round at the base, adaxial side glabrous or pilosulose, abaxial side pilose or rarely glabrous. Inflorescence compound racemose, 3.5–18 cm long, 1–4 cm wide, axis 0–3.5 cm long, with 1–15 racemes. Racemes spikelike, 8–18 cm long, clustered at or near the apex of the culm, spreading, axis smooth.

Pedicels scabrous or glabrous on the edge, paired, unequal, long one 3.5–7 mm long, short one 0.5–3 mm long. Spikelets narrowly ovate, somewhat flattened, 5–10 mm long, 1–1.5 mm wide, callus hairs white or purple, 2.5–10 mm long. Lower glume narrowly ovate, coriaceous, 2–7-nerved, long hairy (3.5–5 mm long), apex bifid, yellow, yellowish brown or pale purple. Upper glume narrowly ovate, coriaceous, long hairy, almost as long as the lower glume, 3–5-nerve d, apex attenuated. Sterile lemma 6–8 mm long, margin ciliate, apex attenuated. Spikelet 2-flowered, but lower floret sterile. Sterile lemma membranous, 1-nerved or nerveless, apex attenuated or acute. Fertile lemma membranous, 4–6.5 mm long, 1-nerved, apex bifid, margin ciliate. Palea membranous, narrowly ovate, 2.5–5.5 mm long, margin ciliate, vein less. Awn geniculate or rarely straight, 5–15 mm long, many prickles on the edge. Anthers 3, 3.2–4 mm long, orange or yellow with purple spots. Stigma feathery, pale purple, exerted from the side of spikelet. Lodicules trapezoid, 0.8 mm long, translucent or white. Caryopsis elliptic, 2–2.5 mm long, dark reddish-brown to bright brown.

Key to the varieties and forms of *Miscanthus oligostachyus*

1. Callus hairs shorter than spikelet; racemes fewer than 13.....2 (var. *oligostachyus*)
   2. Inflorescence axis glabrous .....f. *oligostachyus*
   2. Inflorescence axis ciliate.....f. *ciliatus*
1. Callus hairs longer than spikelet; racemes more than 15.....var. *shinanoensis*

3-1. **Miscanthus oligostachyus** Stapf var. **oligostachyus** f. **oligostachyus**

Specimens examined: **JAPAN. HONSHU. Nagano.** Kitaaiki-mura (K. Sato, 11 Aug. 1958, TI); Mt. Kurodake (K. Mayebara H369, TI); Mt. Yamizo (I. Ando, Aug. 1928, TI); Nobeyama (K. Sato 407, TI). **Shizuoka.** Fujiyama (U. Faurie 6642, KYO); Mt. Fuji (T. Shimizu, 22 Aug. 1977, KYO). **Miyagi.** in monte Katta alt. 1200 m (U. Faurie 5301, KYO); Mt. Zao (S. Murai, 22 Aug. 1931, KYO); Karita-gun, Mt. Katta (T. Makino, 23 Oct. 1906, MAK); Shibata-gun, Kawasaki-machi, Sasaya pass (J. Yokoyama & al. 97104070, TUS); Shibata-gun, Mt. Katta (S. Kusano, 01 Sep. 1899, TI); Kawasaki-machi, Sasaya pass – Mt. Kakesugamine. alt. ca. 900–1200 m (T. Azuma & K. Yonekura 505, TUS). **Yamagata.** Mt. Gando (M. Kato, 31 Aug. 1932, KYO); Yamagata-shi, Sasaya pass (J. Yokoyama & al. 97104066, TUS). **Fukushima.** Mt. Zao (A. Kimura & S. Sugaya, 09 Sep. 1953, TUS); Higashishirakawa-gun, Tanagura-machi, Mt. Yamizo-san (Sadao Suzuki 747, TUS); Nishi-shirakawa-gun, Izumizaki-mura, Karasu-tohge Pass (Sadajiro Suzuki 3734, TUS); Koseki-mura, Banzawa (C. Suzuki, 15 Jul. 1937, TUS); Nishigoh-mura, Kasshi Niramiiwa (S. Suzuki 7035, TUS); Omotegoh-mura, Banzawa (Sadajiro Suzuki 2329, TUS). **Ibaraki.** Mt. Tsukuba (H. Muramatsu, 23 Oct. 1922, TI). **Tochigi.** Kirifuri, Nikko alt. 750 m (H. Kanai 10378, TI); at the foot of Mt. Narumushi (H. Ito s. n., TI); Nakimushi-yama (H. Ito s. n., TI); Takabayasi-mura, Mt. Kurotaki (H. Sekimoto, 03 Aug. 1936, TI); Kuroiso-shi, Oh-tohge pass (Sadajiro Suzuki, 09 Aug. 1964, TUS); Nasu-gun, Nasu dake, Mt. Asahidake (S. Kanno 8402, TUS); between Nasudake and Santagoe-onsen. alt. 1800 m (G. Murata 18191, KYO, MAK); between Santogoya-onsen and Mt. Asahi. alt. 1750 m (G. Murata, 08 Aug. 1963, KYO); Mt. Asahidake (T. Sato, 18 Aug. 1930, TI); Mt. Ioh (Z. Tashiro, 15 Sep. 1938, KYO); Mt. Kanekuradake (Z. Tashiro, 04 Aug. 1931, KYO); Itamuro – Santogoya spa. alt. 1000 m (M. Mizushima 79, TI); Nasu-machi, Benten spa (Sadao Suzuki, 22 Aug. 1950, TUS); Nasu-machi, Mt. Nasudake (Sadao Suzuki, 23 Sep. 1933, TUS); at the foot of Mt. Nasudake (H. Sekimoto 5, TI); Mt. Nasudake (H. Hatakeyama, Aug. 1929, TI; G. Koidzumi, 09 Aug. 1938, KYO); Nikko-shi (C. Abe 20387, 20388, TKPM; J. Matsumura 172, TI; J. Ohwi & K. Okamoto NSM291, KANA, KYO, 27 Jul. 1951 PNH, TI, 24 Jul. 1951, TUS; S. Kobayashi, 03 Aug. 1964, MAK; T. Makino, 29 Aug. 1901, MAK; Y. Narita, 07 Sep. 1926, KYO); Nikko, Hanai-shi – Urami-taki (M. Mizushima, 12 Aug. 1952, TI); Nikko, Kirifuri alt. 750 m (H. Kanai 10378, KYO, MAK); Nikko, Zyakko. alt. 700 m (Tanaka & Hirose 8868, TI); Nikko-shi, Botanical Garden of Tokyo Univ. (K. Masuda, 03 Aug. 1963, MAK); Nikko-shi & Shioya-gun, Kuriyama-mura, summit of Mt. Tarosan (Sadao Suzuki, 02 Sep. 1947, TUS); Nikko-shi, Senjyogahara (Sadao Suzuki, 02 Aug. 1933, TUS); Nikko-shi, SW. of Senjogahara, Moor. Yumihari pass (Sadao Suzuki, 04 Sep. 1947, TUS); Shiobara-machi, (Sadao Suzuki, 08 Aug. 1949, TUS). **Tokyo.** Mitake (M. Mizushima, 20 Oct. 1946, TI); Mt. Takao (S. Sugaya, 12 Nov. 1935, TUS); Near Mt. Mitake, Ohme-shi (T. Makino 67561, KYO, MAK); Nerima-ku, Ohizumi (T. Makino 1936, MAK); Ohme (K. Hiyama, 18 Oct. 1942, TI); Suginami-ku (S. Naito, Oct. 1906, MAK); Tokura-mura, Bonbori (K. Hisauchi, 16 Aug. 1930, TI); Foot of Mt. Mitake, Nishitama-gun, alt. 300–400 m (M. Mizushima 15011, KYO); Nishitama-gun, along the Tamagawa river (Y. Yabe, 23 Aug. 1899, TI); Okutama-cho, Hikawa (K. Suzuki 12622, MAK). **Kanagawa.** Hakone, Miyagino (M. Shimizu, 08 Aug. 1947, TI); Mt. Ohyama (K. Hisauchi, 01 Sep. 1932, TI); Mt. Tanzawa, Fudakake–Tigatake–Shibusawa (Y. Asai, 28–29 Jul. 1955, TI); Mt. Tanzawa, Toriya–Yakeyama–Aone (Y. Takeuchi 006886, KYO); Mt. Tanzawa (T. Momiyama, Aug. 1928, TI); Tanzawa, Mt. Sannotoh. alt. ca. 1150 m (M. Tsuchiya 6538, MAK); Tsukui-machi, Mt. Ohmuro (S. Shirokawa, 10 Oct. 1984, KANA); Ashigarashimo-gun, Hakone, Mt. Komagatake (K. Koizumi, 21 Aug. 1904, MAK); Naka-gun, Kitahadano-mura, Mt. Sannotoh. alt. 1200 m (H. Kanai, 12 Aug. 1952, TI). **Yamanashi.** Asiyasu-mura, Yashajin-tohge. alt. 1700 m (T. Yamazaki 3759, TI); Hinatayama, Hakushu-machi, Kitakoma-gun (Y. Katayama, 19 Aug. 2001, TKPM); Lake Shoji (Y. Ogawa, 25 Jul. 1919, TI); Mashitomi-mura (H. Uematu, 07 Sep. 1949, TI); Misaka-tohge pass (H. Kanai, 18 Sep. 1955, TI); Mitsutohge (K. Hisauchi 865, TI); Mt. Fuji. alt. 1000–2700 m (C. C. Hsu & F. Maekawa, 23 Oct. 1962, TUS); Mt. Fuji, Yoshida tozanghchi (G. Nakai 2873, KYO); Mt. Hakusoh (S. Gotoh, 19 Aug. 1904, TI); Mt. Kinpuzan (J. Nakae, 12 Aug. 1911, MAK); Mt. Mitsutohge (S. Kobayashi, 17 Sep. 1977, MAK); Mt. Mitsutohge (Y. Momiyama, 18 Sep. 1977, MAK); Nashigahara, Yamanakako village, NE foot of Mt. Fuji. alt. 1000 m (F. Konta 11658, KYO, MAK); Oshino, foot of Mt. Fuji (T. Mori 3255, TUS); Shiraminehirogawara (J. Doi, 26 Aug. 1929, KYO); W. side of Mt. Fuji (H. Ohba 69824, TI); Sengen-jinja, Shinya, Fujiyoshida-shi. alt. 870 m (N. Kurosaki 8509, KANA); Fujiyoshida-shi, Sengen-jinja, NEN-part of Mt. Fuji alt. 850 m (G. Murata & al. 33858, KYO); Yoshidaguchi (K. Nakajima, 31 Jul. 1908, MAK); Yoshidaguchi (T. Makino 1924, MAK); Higashiyamanashi-gun, Ohkuratakamaru. alt. ca. 1640 m (M. Tsuchiya 5721, MAK); Kitakoma-gun,

Mashitomi-mura alt. 1000 m (T. Yamazaki, 24 Aug. 1958, TI); Kitatsuru-gun, Uenohara-machi, Mt. Ohgi (S. Okamoto, 07 Aug. 1935, KYO); Okishinhata, Yamanakako-mura, Minamitsuru-gun, alt. 950 m (M. Togashi, 23 Aug. 1984, KYO); Minamisaku-gun, Kawakami-mura (K. Ohwi 47, TI); Kitaaiki-mura, Kurio-tohge (T. Takei 383361–22, KANA); Minamimaki-mura, Ohshiba (K. Sato 3205, TI); Yamanakako-mura, Okishinbata (M. Togashi, 23 Aug. 1984, TUS); Minimitome-gun, Yamanakako-mura (T. Nakaike, 01 Aug. 1969, KANA). **Nagano.** Akaho-mura (H. Suzuki, 10 Aug. 1927, KYO); Mt. Nenjyo, Matsukawa-dani, Kamikatagiri-mura (G. Murata 5813, KYO); Mt. Hohkendake, Komagane-shi (S. Kobayashi, 25 Aug. 1960, MAK); Mt. Kisokomagatake (K. Ogawa 2850, KYO); Mt. Mikuni-yama, N. of Jyumonji tohge. Kawkami-mura, Minamisaku-gun, alt. 1500 m (M. Hutoh 23254, KYO); Mt. Otokoyama, Kawakami-mura, Minamisaku-gun, alt. 1000–1600 m (H. Okuhara 635, KANA); Mt. Tenguyama, Kawakami-mura, Minamisaku-gun (T. Tabuchi, 02 Oct. 1996, TKPM); Miniamisaku-gun, Kitaaiki-mura, Shiroiwa. alt. 1000 m (J. Murata & al. 1206, TI). **Gifu.** Takayama-shi (H. Nagase 921435, KYO). **Shizuoka.** Abe-tohge, Umegashima-mura, Abe-gun, alt. 1400 m (H. Koyama & Y. Huzimoto 708, KYO, MAK, TI); Abe-tohge, alt. 1400 m (Yamazaki & Matsuda, 10 Oct. 1954, TI); at the foot of Mt. Fuji, Lake Shoji (H. Kanai, 15 Sep. 1957, TI); E. side of Mt. Fuji (M. Nakayama 11, MAK); Kagosaka-tohge (J. Sugimoto, 26 Aug. 1931, KYO); Mt. Fuji (T. Makino, 15 Aug. 1898, MAK; M. Matsuda, Sep. 1906, TI; S. Namishima, 02 Aug. 1928, TI; T. Makino, 17 Aug. 1899, MAK; T. Takahashi 38, MAK; Yamamoto, 19 Aug. 1907, MAK); Mt. Fuji, Yoshidaguchi (C. Abe 56720, 56721, TKPM); Mt. Fuji, Yoshidaguchi, Susono (K. Oki, 03 Aug. 1924, TI); Mt. Kenashiyama, Fujinomiya-shi. alt. 1600 m (S. Horino & al. 124, KYO); Mt. Nokogiriyama, Mts. Ashitakayama (H. Kanai 6893, TI); Mt. Fuji, Subashiriguchi – 5 gohme (M. Hashimoto 8206, KANA); Mt. Fuji, Gotenba-guchi (S. Irikura, Sep. 1973, TI); Mt. Fuji, Subashiri, Tarohboh (H. Muramatsu, 30 Jul. 1924, TI); Subashiri-mura, (T. Makino, 25 Jul. 1914, MAK); Abe-gun, Ikawa-mura (Y. Kurosawa, 08 Aug. 1932, KYO); Tagata-gun, Nakaizu-cho, Mt. Amagisan (K. Suzuki 13497, MAK); Tarohboh, SE-slope of Mt. Fuji. alt. 1300 m (G. Murata & al. 33921, KYO, MAK, TI); Fujinomiya-shi, en route from Fumoto to the top of Mt. Kenashiyama alt. 1300–1600 m (H. Takahashi 10871, KYO); en route from Fumoto to the top of Mt. Kenashiyama alt. 1800–1940 m (H. Takahashi 10951, KYO); Gotenba-shi, en route from Tarohboh to Futatsuzuka, SE slope of Mt. Fuji. alt. ca. 1800 m (F. Konta 11361, KYO); en route from Tarohboh to Umegaeshi, E. slope of Mt. Fuji. alt. 1000–1300 m (N. Kurosaki 13337, KANA, KYO); Tarohboh, Mt. Fuji (C. Abe 56722, 56723, TKPM); Tarohboh, Mt. Fuji. alt. ca. 1450 m (T. Kubo 209, KYO, TI, TUS); Tarohboh, E. slope of Mt. Fuji. alt. 1300 m (N. Kurosaki 8566, KANA); Shizuoka-shi, Umegashima-onsen – Abe-tohge. alt. ca. 1000–1400 m (K. Inoue & al. 1395, TI); vicinity of Ikawa pass, Ikawa, E. of Ikawa lake. alt. ca. 1600 m (M. Saito & al. 2069, KYO); Sunto-gun, Subashiri-mura (T. Makino, 25 Jul. 1914, TI); Subashiri-mura (T. Makino 45234, MAK, KYO). **Tottori.** en route from Kamihohshu-goe to Kengamine, Mt. Daisen. Daisen-cho, Saihaku-gun, alt. 1400–1600 m (N. Kurosaki 14537, KYO, TUS); Mt. Daisen (N. Satomi, 10 Aug. 1952, KANA); Mt. Daisen, Gyozjadani-chozjo-shimo, Hohzuyama. alt. 800–1700 m (M. Hashimoto 3899, KANA); Daisen-cho (T. Makino, Aug. 1906, MAK); Daisen-cho, Mt. Daisen (A. Tanaka 24051, KYO; I. Yokota, 23 Aug. 1909, KYO; K. Yokomizo 14, KYO; C. Abe 20390, 20391, TKPM; N. Satomi 152, MAK; T. Takahashi, 12 Aug. 1938, KYO); Hino-gun, Uradaisen, Kagamiganaru (K. Oka 25993, TUS); Saeki-gun, Daisen-cho (M. Nishiyama, 29 Sep. 1906, MAK); Saihaku-gun, en route from Shimohohshu-goe to Kamihohshu-goe, Mt. Daisen, Daisen-cho, alt. 1000–1400 m (N. Kurosaki 144472, KANA, KYO, TUS). **SHIKOKU. Tokushima.** Mt. Ishidateyama, Kitou-son, Naka-gun (C. Abe 56724; T. Tabuchi, 28 Oct. 1998, TKPM). **Ehime.** Mt. Akaishi, Niihama-shi (S. Takafuji 68, 2382, TKPM); Mt. Higashi-Akaishi (Z. Tashiro, 29 Aug. 1927, KYO); Uma-gun, Mt. Higashi-Akaishi, en route from Ohkawa to the summit. alt. 1300 m (G. Murata 14779, KYO); Mt. Higashi-Akaishi, en route from Ohkawa to the summit. alt. 1400 m (G. Murata 14721, KYO); on the way from Kawamata to Mt. Higashi-Akaishi. alt. 1500 m (T. Yahara 5759, KANA, KYO). **Kochi.** Mt. Ishidateyama, Monobe-son, Kami-gun (Y. Akasawa 60–40, TKPM). **KYUSHU. Kumamoto.** Mt. Asosan (Yabe s. n., TI; K. Oka 11111, TUS; W. Sato, 12 Sep. 1932, KANA); Mt. Asosan, Nakadake (Y. Ogawa 12, TI); summit of Mt. Asosan (H. Muramatsu, 20 Aug. 1938, TI); Aso-gun (T. Makino, Aug. 1907, MAK); Aso-gun, Aso-cho, Mt. Asosan (C. Sugawa, Sep., MAK); en route from Hinao pass to Mt. Nishimine, W. of Mt. Nekodake, Aso-gun (T. Yahara 4710, KANA, KYO). **Ohita.** Mt. Kuju (S. Sako 2826, MAK; M. Tokunaga, 09 Aug. 1927, KYO); Mt. Kuji. alt. 1300 m (S. Sako 2825, KANA); Mt. Kurodake (Z. Tashiro, 06 Sep. 1927, KYO); Mt. Sobo (S. Saito 760, TI); Mt. Kuju, Mt. Shirakuchi (T. Yamazaki, 17 Oct. 1955, TI); Mt. Kuju, Mt. Ioh (T. Yamazaki, 15 Oct. 1955, TI); Mt. Ohfuna (Z. Tashiro, 11 Aug. 1933, KYO); Mt. Waita (K. Mayebara H368,

TI); Mt. Yubu (S. Iwasa 16, MAK). **Miyazaki.** Mt. Higashi-Kirishima (Y. Doi, 08 Oct. 1927, KYO); Mt. Karakami, Ebino-shi (Murata & al. 7, KYO); Mt. Kirishima (I. Nagashima 1904, MAK; K. Mayebara 367, TI; Y. Doi 72, TI); Mt. Kirishima, Mt. Karakuni (T. Makino, Aug. 1909, MAK). **Kagoshima.** Mt. Nishi-Kirishima (Z. Tashiro s. n., KYO). Isl. Yakushima, Mt. Miyanouradake (M. Takeuchi, 04 Oct. 1938, MAK);

Distribution: Kyushu, Shikoku, and Southern part of Honshu island. (Fig. 7b). Endemic to Japan.

3-2. **M. oligostachyus** var. **oligostachyus** Stapf f. **ciliatus** Hiyama in J. Jpn. Bot. **19**(7): 226. 1943.

Type: Honshu. Prov. Sagami (R. Kubota, Jul. 1930, Syntype TNS. n. v.), Shikoku, Prov. Iyo (H. M. T. no. 57769 Syntype TNS, n. v.).

Specimen examined: **JAPAN. HONSHU, Yamanashi.** Mitsutohge (T. Tateoka 10405, TI).

3-3. **Miscanthus oligostachyus** Stapf var. **shinanoensis** Y.N.Lee in J. Jpn. Bot. **39**(4): 117. 1964; N.Shirai, Fl. Nagano Pref. 1388. 1997.

Type: Japan. Shinano, Kirigamine (H. Tobida 60, Holotype, Isotype TI).

Specimen examined: Holo- and Isotype.

Lee (1964d) studied the leaf anatomy of this variety and reported that the taxon is a hybrid of certain taxa of the genus *Miscanthus* and *M. oligostachyus* Stapf var. *oligostachyus*.

4. **Miscanthus tinctorius** (Steud.) Hack. in D.C., Monogr. Phan. **6**: 103. 1889; Matsum., Ind. Pl. Jap. 189. 1895; Hack. in Bull. Herb. Boiss. 639. 1899; Nakai in Bot. Mag. Tokyo **31**: 10–11. 1917; Y.N.Lee in J. Jpn. Bot. **39**(10): 295. 1964; T.Koyama, Grass. Jap. Neighb. Reg. 400–402, 518. 1987; Osada, Illust. Grasses Japan: 682. 1989. – *Saccharum tinctorium* Steud. Syn. Pl. Glumac. **1**: 469. 1855. *Saccharum obscrum* non Trin. Auct, Steud., Syn. Pl. Glumac. **1**: 407. 1855. – *Miscanthus sieboldi* Honda in J. Fac. Sci. Univ. Tokyo Sect. 3. Bot. **3**(1): 392. 1930.

Type: Japan (Siebold s. n., n. v.).

Perennial with rhizomes. Rhizomes hard, covered by scales. Culms tufted, erect, hard, 48–186 cm tall, 3–4 mm in diameter at the middle, swollen at the base. Nodes hairy (hairs 1–2 mm long), otherwise smooth. Leaves green, sheath rounded on the back, collar hairy (hairs 1.5–3 mm long). Ligule membranous, 2–3 mm long, obtuse or truncate, ciliate at margin. Leaf blade narrowly narrowly ovate 9–46 cm long, 7–26 mm wide, attenuate at the base, both side glabrous or tomentulose near the base. Inflorescence compound racemose, 10–19 cm long, 1–5 cm wide, axis 0.5–3 cm long, with 2–11 racemes. Racemes spikelike, 8–18 cm long, clustered at or near the apex of the culm, spreading, axis smooth.

Pedicels glabrous or hispidulous on the edge, paired, unequal, long ones 3–7 mm long. short ones 0.5–2 mm long. Spikelet narrowly ovate, somewhat flattened, 4–8 mm long, 1 mm wide, callus hairs white, yellow, purple or gray, 2–4.5 mm long, much shorter than spikelet. Lower glume narrowly ovate, coriaceous, 3–7-nerved, lustrous, long hairy (hairs 1–4 mm long), yellow, yellow with red spots, brownish yellow or reddish purple, apex attenuated or bifid. Upper glume narrowly ovate, coriaceous, long hairy, almost as long as the lower glume, 3–5-nerved, lustrous, villosulous, apex attenuated. Sterile lemma 4–5 mm long, margin ciliate, 1-nerved or nerveless, apex acute. Spikelet 2-flowered, but lower floret sterile. Sterile lemma membranous, 1-nerved or nerveless, apex attenuated or acute. Fertile lemma membranous, 3.5–4.5 mm long, 1-nerved, apex attenuated, margin ciliate. Palea membranous, 2.5–4 mm long, margin ciliate, vein less. Awn strait, 1–3 mm long or awn less. Anthers 3, 2.5–2.8 mm long, yellow. Stigma feathery, dark purple, exerted from the side

of spikelet. Lodicules trapezoid, 0.6–0.8 mm long, dark red.

Specimens examined: **JAPAN. HONSHU. Miyagi.** Matsushima (A. Kimura, 12 Oct. 1941, TUS); Shiogama-cho (R. Endo, 28 Sep. 1913, TUS); Shobuda (S. Tamaki s. n., TI); Miyagi-gun, Matsushima-cho, Matsushima (T. Makino, 24 Sep. 1906, MAK). **Fukushima.** Aizu (J. Matsumura, 1879, TI); Tajima-machi (T. Mori 5636, TUS); Aizuwakamatsu-shi (S. Kanno 8351, TUS); Kohriyama-shi, Yamadahara (Sadajiro Suzuki, 10 Nov. 1955, TUS); Minamiaizu-gun, Inan (S. Tamaki, 10 Aug. 1910, TI); Inan (S. Tamaki 45, MAK, TI); Nishiaizu-machi, Mizusawa (S. Saito 62284, TUS); Nishishirakawa-gun (N. Imai, Aug. 1907, MAK; Sadajiro Suzuki, 1983, TUS); Karasu-tohge (T. Saito 1533, TI); Kasshi (D. Shimizu 48, MAK; Sadao Suzuki 2724, TUS); Omotegoh-mura (Sadao Suzuki 11264, TUS); Setohara (Sadajiro Suzuki, 20 Sep. 1954, TUS); Shirakawa-machi (Choji Suzuki, 14 Oct. 1937, TUS); Shirakawa-shi (Sadajiro Suzuki, 07 Sep. 1935, TUS); Kinshoji (Sadajiro Suzuki 3831, 20 Aug. 1932, TUS); Sekibe (Sadao Suzuki 8689, TUS). **Tochigi.** Nasu, Sasadaira (S. Kitamura, 31 Aug. 1973, KYO); Nasu-gun, Ashiro-cho (H. Sekimoto 2, TI). **Gunma.** Tone-gun, Tone-mura (Osaka Women's College 678, MAK) **Niigata.** Mt. Myohji (T. Ajima 1677, KANA); Kitauonuma-gun, Gongendohyama (S. Iwata 70, MAK); Hirokami-mura (I. Ito 23209, TUS, 23207, TI, 06 Sep. 1982, TI); Minamikanbara-gun, Mt. Mannosukeyama (T. Yamazaki 5130, TI); Shimoda-mura (H. Funakoshi 97100206, TUS); Shimoda-mura, Shionofuchi (H. Funakoshi 97100201, 97100202, 97100203, TUS); Nishikubiki-gun (Y. Ikegami 541, TUS); Aomi-cho (M. Hiroe 14221, KYO); Myoko-mura (T. Kurihara, 18 Aug. 1904, MAK); Nishikubiki-gun, Kotaki (Y. Ikegami 755, KYO). **Toyama.** Mt. Ushidake (H. Furuike, 27 Aug. 1957, KANA); Iguchi-mura, Maruyama (Ishioka 460, KANA); Kamiichi-machi, Nagaraike pond (N. Kurosaki 2714, KYO); Kurobe (M. Honda, 24 Oct. 1927, TI); Kurobe-keikoku, Babadani (T. & F. Yamazaki, 29 Aug. 1993, TI); Mt. Asahidake (N. Satomi & R. Mochizuki, 31 Aug. 1969, KANA); Mt. Iohzen (I. Honda 4194-vii, KANA); Nakagohchi (N. Satomi 13038, KANA); Shimo-niikawa-gun, Kurobe (T. Makino 1935, MAK); Yatsuso-cho, Ida (Y. Hasegawa 27, MAK); Ainokura, Taira-mura, Higashitonami-gun (G. Murata & H. Koyama 41263, KYO); Nagaraike, Nakaniikawa-gun (N. Kurosaki 2714, KANA); Nakaniikawa-gun, Kamiichi-machi (N. Kurosaki 12105, KANA); Senjagahara (N. Kurosaki 12066, TUS); Ohsawa (N. Kurosaki 2373, KANA); Ohiwa, Kamiichi-machi (N. Kurosaki 3549, KYO); Senjagahara, Toyama-machi (N. Kurosaki 12066, KYO); Asoh, Ohiwa, Kamiichi-machi (N. Satomi 12105, KYO); Takaoka-shi, Futagamiyama hill (Sadao Suzuki, 06 Nov. 1938, TUS); Futagamiyama hill (Sadao Suzuki, 03 Oct. 1937, TUS); Toyama-shi, Kurehayama hill (Sadao Suzuki, 29 Aug. 1962, TUS); Kurehayama (T. Matsumoto 81, MAK). **Ishikawa.** Anamizu-cho (K. Yoda, 30 Aug. 1991, KANA); Gojuli, Yanagida-mura (N. Sakai, 15 Aug. 1969, KANA); Kanazawa, Kurokobe (G. Masamune 5167, KANA); Monzen-machi (Satomi & Yamada, 19 Sep. 1980, KANA); Mt. Hakusan (M. Hashimoto 6301, KANA); Mt. Hakusan from Onsenguchi to Iwama-onsen (M. Hashimoto 4210, KANA); Mt. Hotatsusan (Masamune 5013, KANA); Mt. Iohzen (Murayama, 30 Sep. 1965, KANA; N. Fukuoka 445, KYO); Mt. Iohzen, Sugaike pond to the summit of Mt. Shirahage (T. Taniuchi 1027, KANA); Mt. Shirahage – Mt. Okuioh (T. Murakami, 29 Aug. 1965, KANA); Mt. Hakusan (D. Nikai 1870, TI); Mt. Utatsuyama (G. Masamune 5193, KANA; R. Hara 521, KANA); Notojima (G. Masamune 13999, 14027, KANA); Ogi, Tsukumowan (N. Satomi, 21 Sep. 1957, MAK); Ishikawa-gun (I. Shimozawa, 30 Aug. 1953, KANA; I. Umeda, 05 Sep. 1954, KANA); Ishikawa (G. Masamune 11916, KANA); Shiramine-mura (M. Hashimoto & al. 1080, KYO, TUS); Shiramine-mura (T. Makino 1935, MAK); Yoshinodani-mura (N. Satomi 24626, KYO; Y. Sugie 5031, KYO); Shiramine, Shiramine-mura (M. Hashimoto & al. 1101, KYO); Tsubata-machi, Kahoku-gun (N. Kurosaki 12128, KYO); Kanazawa-shi (K. Handa, 20 Aug. 1952, KANA); Kadoma-cho (Satomi Yamamoto, 30 Sep. 1983, KANA); Kunimi-yama (S. Matsuda 1007, KANA); Mt. Utatsuyama (G. Masamune 5193, TUS); Udatuyama (R. Hara 13193, KANA); Komatsu-shi (S. Tsugaru & G. Murata 16976, TUS); Ezashi (S. Tsugaru & G. Murata 16976, KYO); Nunohashi-machi (S. Tsugaru & T. Takeuchi 7304, KANA, KYO); Nomi-gun, Shirane-mura (D. Nikai 1875, TI); Noto, Mt. Hodatsusan (S. Yamamori 3819, KANA); Nohbi-gun, Shimotokuyama (T. Fukui, 08 Sep. 1968, TUS); Tatsuguchi-cho (T. Fukui, 08 Sep. 1968, KANA); Tatsunokuchi-cho (T. Fukui, 30 Sep. 1968, MAK); Suzu-gun, Inter Ukai et Mt. Horyu (G. Masamune 5797, KANA); Mt. Horyu (T. Terashita, 22 Aug. 1955, 14 Sep. 1950, KANA); Ogi (Furuike 9239, KANA; N. Satomi, 21 Sep. 1957, KANA); Ogi, Isl. Hohrai (N. Satomi 9538, MAK). **Fukui.** Ito-mura, Kazarano (M. Maeda 469, 25 Aug. 1951, KANA); Ogura (M. Maeda, 20 Sep. 1951, KANA); Kurokawa (Z. Tashiro, 06 Oct. 1935, KYO); Mt. Arashimadake (T. Honda, Sep. 1934, KYO); Imadate-gun, Mt. Kanmuriyama (Y. Hosoi, 15 Aug. 1936, TI); Katsuyama-shi, Ikegahara (S. Watanabe 31786, KYO);

Kitasato-cho (Satomi & al., 19 Sep. 1983, KANA); Nanjo-gun, Imajo-cho, en route from Iwaya to Yashagaike (N. Fukuoka 6992, KYO); Ohno-gun, Izumi-mura (S. Watanabe 39075, KYO); Ohno-shi, along Karasawa (N. Kurosaki 11090, KANA, KYO); Mt. Kyohgatake, Ohno-shi (G. Murata & T. Shimizu 356, KYO). Mt. Kyohgatake (S. Watanbe 31838, KYO); Mt. Sannomine (S. Watanabe 42, KYO); Rokuroshi, Ohno-shi (G. Murata & T. Shimizu 295, KYO); Tsuruga-shi, near Ikenokochi (S. Kitamura & G. Murata 2032, KYO, MAK, TI). **Nagano.** Kinasa-mura (T. Makino, Aug. 1911, MAK; T. Sakai, 09 Aug. 1910, MAK); Kurohime-kogen, Shinano-machi, Kamiminochi-gun (M. Ogawa 07505, TKPM); Mt. Komagatake (T. Saiki, 07 Aug. 1910, MAK); Mt. Togakushiyama (T. Makino, Aug. 1906, MAK); Ohike to Renge (C. C. Hsu 3204, TI); Shinoi-cho (M. Minemura 285, MAK); Uematsu (S. Shimazu, 28 Aug. 1916, TI); Kiso-gun, Kisofukushima-cho, Kamiogawa-sawa (G. Murata 71138, KYO); Yamaguchi-mura (S. Iwano 17671, TUS); Kitaazumi-gun, Hakuba-mura, Happoh-one (H. Kanai, 19 Sep. 1959, TI); Iori (Sadao Suzuki, 10 Sep. 1971, TUS); Yotsuya (Y. Yabe, 17 Aug. 1900, TI); Nishichikuma-gun, Mt. Komagatake (J. Umemura, 20 Aug. 1902, MAK); Kamata (Z. Tashiro, 06 Sep. 1929, KYO). **Gifu.** Kokufu-cho (H. Nagase 9214381, KYO); Mt. Komagatake (Yatabe, 10 Sep. 1884, TI); Shirakawa-mura (M. Togashi TSM1072, KYO, KANA, TI, TUS, 02 Sep. 1954, MAK); Takayama (M. Honda, 10 Aug. 1925, TI; Z. Tashiro, 12 Sep. 1927, KYO); Ena-gun, Sakamoto-mura (M. Matsui 47, MAK); Ohno-gun, Shirakawa-mura, Mt. Hyotan (K. Deghchi 6050, KYO); near Amoh-tohge, Shirakawa-mura (S. Tsugaru & al. 12922, KYO); Kuguno-cho (H. Nagase 901613, KYO); Shirakawa-mura (A. Nitta 12155, KYO; M. Hashimoto c-1732, KANA); Tajimi-shi (J. Umemura, 22 Sep. 1902, MAK); Takayama-shi (H. Nagase 921434, 921436, KYO); en route from Chishima to Matsukura-kannon, Mt. Genjidake (N. Fukuoka 7445, KANA, KYO); Yohroh-gun, Ichinose-mura, Mt. Kasagatake (M. Matsui 68, MAK). **Aichi.** Hondani in Mt. Dando (G. Murata 6672, KYO); Kanda, Tashiro (K. Torii 1227, KYO); Kobayashi (K. Torii 1212, KYO); Minamishidara-gun, Tsukude-mura (T. Makino, 09 Sep. 1906, MAK). **Mie.** Jusha-mura, Kawahara, Okuyama (Y. Ichiki, 07 Aug. 1935, KYO). **Shiga.** Imazu-cho, Umegahara (C. Hashimoto 8218, KYO); Mt. Miedake (Z. Tashiro, 24 Oct. 1927, KYO); *Mt. Ibukiyama (D. Nikai 1869, TI; G. Murata* 13523, KYO; K. Hisauchi 1223, TI; K. Inagaki, 28 Aug. 1928, TI; T. Makino, Aug. 1906, MAK, 04 Nov. 1893, MAK, MAK109640, KANA; Y. Yabe, 07 Sep. 1901, TI; Z. Tashiro, 02 Sep. 1928, KYO); Mt. Mikuniyama (Z. Tashiro, 23 Sep. 1927, KYO); Saijo (C. Hashimoto, 24 Sep. 1927, KYO); Higashiasai-gun, Asahi-mura (C. Hashimoto 8441, TI); Higashiasai-gun (G. Murata 20800, KYO, TI); Ika-gun, Yogo-machi (Y. Tateishi & T. Nemoto 12273, TUS); Shizugatake, Yogo-mura, Ika-gun (G. Murata 30146, KYO); Sakata-gun, Ibuki-cho (G. Murata 70836, KYO); Ibuki-mura (T. Makino 1931, MAK); Takashima-gun, Kuchiki-mura, en roure from Kuwahara to the summit of Mt. Mikunidake (N. Kurosaki 11937, KYO); Inumaru, Udoya, Kuchiki-mura (N. Kurosaki 11901, KANA); Kutsuki-mura (N. Kurosaki 11901, KYO); Makino-cho (G. Murata 79046, KYO); Mt. Akasakayama, Makino-cho (G. Murata 18910, KYO); Imazu-cho (C. Hashimoto 8218, TI); Kuchiki-mura, Mt. Mikunidake (N. Kurosaki 1466, MAK). **Kyoto.** Kuta to Kuta-tohge, Sakyo-ku (G. Murata 17444, KYO, MAK); Mt. Chohrohgatake, en route from Hodosu to the summit (G. Murata 15263, KYO); Mt. Takagamine (M. Tagawa, 01 Sep. 1929, KYO); Tanba, Ashio (S. Okamoto, 10 Sep. 1936, KYO); Mt. Sarayama, Maidzuru-shi (S. Tsugaru & M. Sawada 19512, KYO); Mt. Hangokusan, Kameoka-shi (S. Tsugaru & T. Takahashi 17218, KYO); Mt. Hieizan (T. Makino 1925, MAK); Tanba, Mt. Chohrohgatake (T. Takeuchi, 07 Sep. 1932, KYO); Tango, Mt. Aobayama (Y. Araki 1086, TI); Ichishi, Iizumi-cho, Ayabe-shi (S. Tsugaru & al. 19066, KYO); Funai-gun, Gomasato-mura (Y. Araki 1326, TI); Kamiotomi (S. Tsugaru & T. Takahashi 19014, KYO, TUS); Mt. Chohrohgatake (S. Tsugaru & al. 19165, KYO; T. Shimizu, 30 Sep. 1979, KYO; Y. Araki 1410, TI); Mt. Nishimotoume-mura (M. Tagawa 2018, KYO); Takahara-mura (Y. Araki, 26 Aug. 1933, TI); Wachi-cho (S. Tsugaru & T. Takahashi 19165, TUS); Goma (K. Nogai 25350, KYO); Ikaruga-gun, Okukanbayashi-mura, Tanba, Kimioyama (G. Murata 10419, KYO); Okukanbayashi-mura, Tanba (G. Murata 10279, KYO); Kameoka-shi, Akakuma (S. Tsugaru & al. 22954, KYO); Kitakuwada-gun, Miyama-cho (S. Tsugaru 16826, TUS); Ojio (Y. Araki 13557, TI); Miyama-cho, SSW. slope of Mt. Mikunidake (N. Kurosaki 16828, KYO).

Distribution: Mainly existing Japan sea side of Honshu Isl. (Fig. 7c). Endemic to Japan.

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茨木 靖[a], 大橋広好[b]：**イネ科ススキ属カリヤス節の分類学的研究**

ススキ属カリヤス節は，毛が多くやや短い披針形の葉と大きな小穂を持っていることで特徴づけられる．ススキ属はオセアニアからアジアにかけての広い地域に分布しているが，カリヤス節は韓国と日本のみから報告され，その中に5分類群を認める見解が現在では一般的である．それらは，*Miscanthus changii* Y.N.Lee，オオヒゲナガカリヤスモドキ，カリヤス，カリヤスモドキおよびシナノカリヤスモドキである．しかしながら，我々のススキ属に関しての分類学的再検討の結果，この節内には7分類群があることがわかった．そのうち，韓国にはヒゲナガカリヤスモドキと *M. longiberbis* var. *changii* (Y.N.Lee) Ibaragi & H.Ohashi が，日本にはオオヒゲナガカリヤスモドキ，カリヤス，カリヤスモドキ，ケカリヤスモドキそしてシナノカリヤスモドキがあり，両国に共通して分布する分類群はないことが明らかになった．各分類群について形態の記載，検索表，分布図などを示した．

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